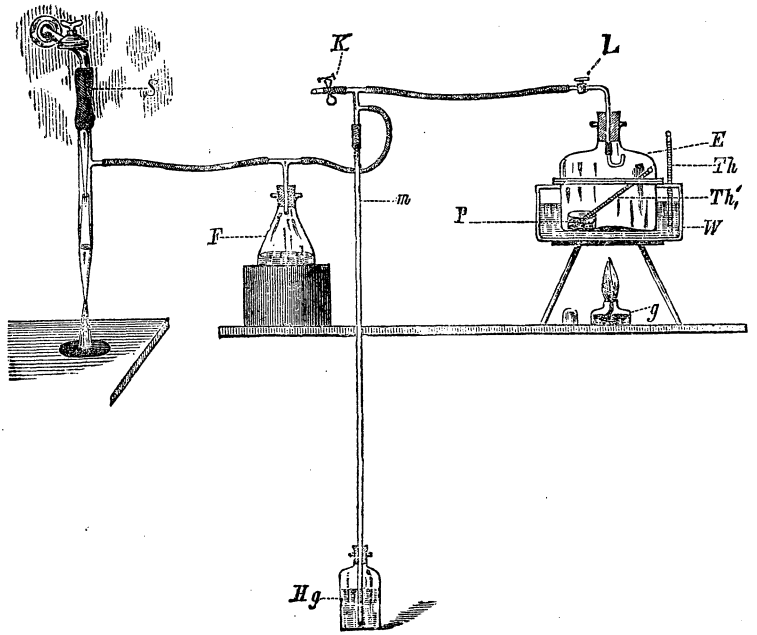
MICROSCOPY AND HISTOLOGY.[1]

IMBEDDING APPARATUS.—The complete saturation of objects more than a few millimeters in thickness with paraffine is often a difficult operation. After soaking for hours in melted paraffine, it is frequently found, when it is too late for remedy, that saturation has not been sufficiently complete in all parts of the object. In imbedding relatively large anatomical preparations, the penetration of the paraffine to all parts can be secured by the aid of a good air-pump; but this method is tedious, and robs one of time. The same end may be reached with very little cost of time and labor by means of a suction-pump, such as is used in chemical laboratories, provided only that the water pressure at command is sufficiently great to do the work. Dr. F. W. Hoffman[2] has described a very simple apparatus to be used with the suction-pump.



The suction-pump, *S*, is connected with the exsiccator, *E*, by means of rubber tubing, through each portion of which runs a piece of glass tubing as a protection against undue compression. The exsiccator, holding the small basin of paraffine, *P*, in which is placed the thermometer, *Th'*, stands in a zinc pan, *W*, containing water and a thermometer, *Th*. The capacity of the pan should be such that the temperature of the water can be kept quite even during the process of imbedding. The flask, *F*, introduced between

[1] Edited by Dr. C. O. WHITMAN, Mus. Comparative Zoology, Cambridge, Mass.

Zool. Anz., VII, No. 165, p. 230, 1884.

S and *E* by means of a T-shaped tube, serves to catch any water which may find its way into the connecting-tube in consequence of variation in the water-pressure. The glass tube, *m*, the lower end of which is in a bottle of mercury, serves as a manometer. The pressure indicated enables one to judge whether the preparation is saturated with paraffine.

In using this apparatus the water-bath, *W*, should be first heated to a temperature of about 60°; then the basin, *P*, containing *melted* paraffine and the object to be imbedded, may be placed in the exsiccator and the pump set in operation. When the mercury reaches the highest point in the tube, *m*, and air-bubbles cease to rise from the object, the process is ended, and the air admitted by loosening the screw-clamp, *K*. Before admitting the air, the stop-cock, *L*, can be closed, in case it is thought best to leave the preparation still longer in vacuum. As soon as sufficient time has been given for complete saturation, the stop-cock, *L*, is opened slowly, and the air streams in. The end of the connecting-tube is bent upward in *E*, in order that the paraffine may not be disturbed by the inflowing air. Finally, the object is taken out and placed in a box of melted paraffine and left to cool.

With a water-pressure of 700—720 mm. Hg., most objects will be completely saturated within 20 minutes.

Treatment of the Ova and Embryos of the Aphides.—Witlaczil[1] gives a lengthy paper on the development of the aphides, and in it the following information on methods:

The embryos of the viviparous aphides were examined in a weak salt solution (1½ per cent), in which they live for about an hour. The ovaries contain embryos in different stages of development, and have to be isolated for study.

The early stages in the development of the ova may be studied to advantage after treatment with hydrochloric acid (3 per cent), or acetic acid, as these reagents partially dissolve the yolk elements and thus render the preparation more transparent. The later stages, on the contrary, are rendered more opaque by the same treatment.

The ovaries of viviparous aphides were prepared for sectioning, by Ludwig Will,[2] in the following manner:

The aphis is killed in water heated to about 70° C., then hardened in successively higher grades of alcohol. In order to color in toto, the cuticula must be punctured with a sharp needle, and then the dye will penetrate easily to all parts. As very thin sections are required for the study of such small elements, it is best to use dyes that stain very deeply, such as borax-carmine and hæmatoxylin. It is further necessary to employ either the shellac or the collodion method of fixing the sections, otherwise the important parts are liable to drop out of place.

[1] *Zeitschr. f. wiss. Zool.*, XL, Heft 4, p. 563–564.

[2] Semper's Arbeiten, VI, 1883.

THE ORGANIZATION OF THE ECHINORHYNCHI.[1] — 1. *Method of Preparation.*—It is a very difficult matter to kill Echinorhynchi instantly. This cannot be done either with corrosive sublimate or strong osmic acid, even after preliminary treatment with tobacco smoke or chloroform. Thus treated, they contract strongly, and remain so after death.

Much the best results are obtained by killing gradually with 0.1 per cent osmic acid, in which they contract during the first hours, but stretch out again and die fully extended. This method causes slight swelling, but does not seriously injure the object for histological investigation. In specimens left for twenty-four hours in the osmic acid, it is easy to isolate under the dissecting microscope the subcuticula, and the two layers of muscle-fibers (circular and longitudinal). For the study of the internal organs, the Echinorhynchi should be cut open immediately after death and transferred to a 0.01 per cent solution of osmic acid. The preservation of specimens thus treated may be accomplished in the following manner: After carefully washing away the osmic acid, place the objects in a very dilute solution of potassic acetate in an open vessel, and leave them for two or three days, during which much of the solution evaporates. Finally transfer to a saturated solution in order to clarify so far as possible. Very beautiful preparations are said to be thus obtained.

The course of the nerves may be easily traced in specimens that have lain several days in 1 per cent formic acid. The tissues swell up strongly and become quite transparent so that the nerves can be seen. If the muscular layers be separated from the subcuticula in specimens thus treated, and then stained in gold chloride, the lateral nerve-trunks may be clearly shown. For the histological study of the nerves, the Echinorhynchi should be treated with chromic acid and then stained deeply with borax-carmine.

Chromic acid preparations are also best for the study of the subcuticula. Echinorhynchi live for days in a one-tenth per cent solution of chromic acid, but eventually die in a fully extended condition. Such preparations, after treatment with alcohol, may be colored at once; or, after washing a day or more in running water, exposed to the action of osmic acid, and then colored in borax-carmine.

For the study of the sexual organs, a very dilute picro-sulphuric acid (one part of the acid to eight-tenths part of water) is recommended.

The tissues of the Echinorhynchi are not easily stained. Borax-carmine, which, according to Sæfftigen, is the best staining fluid, must be allowed to act a long time (often one or more days); after a deep stain has been taken, the preparation should be partially discolored by the use of hydrochloric acid in the ordinary way.

[1] *A. Sæftigen, Morph. Jahrb.*, X, Heft 1, pp. 120–163, 1884.

2. *Histology.*—The outer body-wall of the Echinorhynchi consists of four layers: a very thin *cuticula*, a thick *subcuticula*, an *outer muscular layer* (circular fibers), and an *inner muscular layer* (longitudinal fibers).

The subcuticula, which constitutes by far the larger portion of the body-wall, is a complicated web of muscular fibers, in which may be distinguished an inner and an outer zone. The inner zone, lying next to the layer of circular muscle-fibrils, is made up of radial fibers united into bundles. These bundles have the shape of sheaves, the fibers spreading at the ends, but drawn closer together at the middle, so as to leave a system of spaces or canals. Two longitudinal canals are thus formed, having in some species a lateral position, in others a dorsoventral position; and these main trunks are connected by a net-work of anastomosing canals. This system of vessels is filled with a clear fluid, in which numerous granules, resembling oil spherules, together with large nuclei, are suspended. The wall of these vascular spaces consists of radial muscle-fibers alone, showing no indication of a lining epithelium. Sæfftigen thinks that the canal-system of the anterior end, including the lemnisci, does not communicate with that of the rest of the body.

The outer zone of the subcuticula is made up of alternating strata of longitudinal and circular fibers, and is not penetrated by the canal-system. The radial fibers of the inner zone penetrate this outer zone, and reach to the cuticula. Between this outer zone and the cuticula is found a layer which Baltzer has called the "*Streifencuticula*," and which has hitherto been regarded as an inner cuticula. Sæfftigen has brought forward pretty conclusive evidence that this layer is not cuticular, but muscular; and he holds that it is merely a bounding zone of the subcuticula, in which the muscular fibers are more closely packed than in the so-called "outer zone" of the subcuticula. The subcuticula presents essentially the same features in the proboscis and neck as in the body proper.

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SCIENTIFIC NEWS.

— The meeting of the British Association at Montreal was an extremely interesting one and very largely attended; while the interest was mainly centered upon topics pertaining to physics, the proceedings of the sections of geology and of biology were notable. The section of geology was presided over by Dr. Blanford; fifty-one papers were presented. Aug. 29th was given to essays and debates on glacial phenomena, in the course of which Professor James Geikie expressed his inability to draw any sharp line between moraines and kames, as they merge into each other so that one cannot say where one leaves off and the other begins. Kames he regarded as partly morainic and partly of subglacial origin. Debates on the archæan rocks, and the eozoön, were